NASA ADVISORY COUNCIL
National Aeronautics and Space Administration
Washington, DC 20546
Dr. Kenneth M. Ford, Chairman

September 27, 2010

Mr. Charles F. Bolden, Jr.
Administrator
National Aeronautics and Space Administration
Washington, DC 20546

Dear Administrator Bolden:

The NASA Advisory Council held a very productive public meeting at the NASA Jet Propulsion Laboratory on August 5-6, 2010.

As a result of its deliberations, Council approved six observations, eight findings, and eight recommendations at this meeting. They are enclosed for your consideration, along with the minutes from our Council meeting to provide additional background and context.

Thank you for the opportunity to provide our insight and advice concerning NASA and the U.S. civil space program. If you have any questions or wish to discuss further, please contact me.

Sincerely,

Kenneth M. Ford
Chairman

Enclosures

Enclosure

Tracking Number: 2010-03-01 (AC-01)
Airspace System Program's NextGen Work

Finding:
With regard to the Airspace System Program's (ASP's) NextGen work, the Council suggests that greater emphasis be placed on environmental and energy aspects rather than on capacity problems to reflect the increasing importance of these emerging issues.

Tracking Number: 2010-03-02 (AC-02)
Automatic Dependent Surveillance Broadcast

Finding:
We support the new research focused on broader benefits of Automatic Dependent Surveillance Broadcast (ADS-B) and urge that ASP carefully survey complimentary research before committing to specific research.

Tracking Number: 2010-03-03 (AC-03)
NextGen Research

Observation:
Judging by the presentations to the that were focused on the process and program alignment, the Aeronautics Research Mission Directorate's NextGen research is very well connected to national research goals. In order to make a more complete assessment, the Council has requested further discussions be focused on technical content and measures of success.

Tracking Number: 2010-03-04 (AC-04)
Verification and Validation

Observation:
Verification and Validation (V&V) is an important new area of research within aeronautics for NASA. From the information presented, the Council could not determine the focus and technical content of the research in the V&V program plan and the practical application of this research

Tracking Number: 2010-03-05 (CSC-01)
Use of Space Act Agreements

Finding:
The Council finds that use of Space Act Agreements (SAAs) is appropriate for the proposed Commercial Crew Transportation program to develop and demonstrate commercial crew

capabilities for the delivery of astronauts to and from the International Space Station. The use of SAAs is appropriate because the program is envisioned as a public-private partnership, in which both parties provide funding, to develop capabilities that will be owned and operated by the private sector to serve both government and private sector markets. In addition, SAAs allow flexibility in the development of transportation capabilities. For subsequent crew transportation services, the use of Federal Acquisition Regulations (FAR) Part 12 commercial services contract is appropriate.

Tracking Number: 2010-03-06 (CSC-02)
Defining the NASA Market

Recommendation:
The Council recommends that NASA assess and define the NASA traffic requirements for crew transport to and from the International Space Station (ISS) and other Low-Earth Orbit (LEO) destinations prior to issuing a draft solicitation for the Commercial Crew Transportation program. The number of flights and/or seats per year purchased by NASA on U.S. commercial spaceflight vehicles has a significant impact on the business plans of and availability of private investment for commercial providers. In assessing its requirements, NASA should consider how the availability of commercial space transportation capabilities could change the concept of operation of the ISS to get the most out of its infrastructure.

Tracking Number: 2010-03-07 (CSC-03)
Concept of Operations and Acquisition Approach

Recommendation:
The Council recommends that NASA structure the crew transportation service acquisition approach and associated ISS concept of operations to take maximum advantage of the variety of potential commercial transportation capabilities. The Council recommends that future commercial crew transportation service solicitations simply specify the minimum and maximum number of seats to and from the ISS NASA would purchase in a given solicitation. This approach will allow bidders flexibility to structure the offer that best fits the offeror's business model.

Tracking Number: 2010-03-08 (CSC-04)
Federal Aviation Administration (FAA) Licensing

Recommendation:
The Council agrees with NASA that Federal Aviation Administration (FAA) licensing of Commercial Crew services should be the "eventual state." The Council recommends that NASA engage the FAA as soon as possible to discuss FAA licensing of Commercial Crew with the goal of providing clarity to potential offerors regarding the regulatory framework for both development and operation of Commercial Crew capabilities.

Tracking Number: 2010-03-09 (CSC-05)
Business Case for Commercial Crew Transportation

Recommendation:
The Council recommends that NASA continue to develop internal metrics and milestones to oversee its Commercial Crew Transportation program and associated industry. Appropriate internal experts can then use these tools to measure whether NASA crew needs will be met in a timely and cost effective manner under this program. Among other things, NASA should be aware of the impact of non-human spaceflight markets, such as cargo and traditional spacecraft launch, on the ability of commercial providers to offer viable crew transportation services, the cost, reliability, and safety implications of the overall commercial space transportation business, and the impact of domestic and foreign competition.

Tracking Number: 2010-03-10 (EC-01)
No Budget or Roadmap for Space Exploration

Observation:
We note that there is currently no budget or roadmap for space exploration agreed to by the White House, Congress, and NASA leadership. This complicates ESMD operations.

Tracking Number: 2010-03-11 (EC-02)
Liquid Oxygen (LOX)-Kerosene for Heavy Lift Launch Vehicle

Observation:
If NASA selects Liquid Oxygen (LOX)-Kerosene combination of propellants for Heavy Lift Launch Vehicle first stage, the following two considerations should be kept in mind: (1) Russia currently leads LOX-Kerosene propulsion technology; (2) LOX-Kerosene will provide NASA with an opportunity to create a huge operability improvement by using high pressure kerosene as the working fluid in the Thrust Vector Control (TVC) actuation system, thus eliminating the need for hydraulic power generating system. This approach has been successfully used in Russian RD-170 1500K lbs thrust LOX-Kerosene engine resulting in simpler and lower weight engine/TVC system, much easier to operate. In order to benefit from this approach the engine and its TVC should be designed as an integrated system. Outcome of this design decision will not only be a lighter, less expensive to operate propulsion/TVC system, but a "green" stage with complete absence of toxic reactants and conventional hydraulic fluid.

Tracking Number: 2010-03-12 (EC/TIC-01)
Requirements for Space Technology

Finding:
Uncertainties and lack of budget consensus complicate efforts to define, fund, and promote requirements for space technology. The Office of Chief Technologist (OCT) is charged in part

to address future technology development within NASA. The Exploration Systems Mission Directorate (ESMD) has funding for Technology development and demonstrations. We observe that the recently established OCT has made significant and positive advances in identifying advanced technologies required for future human and robotic exploration of space. They have moved forward quickly and aggressively with plans and an organization to rapidly facilitate technologies that will be required for a variety of future missions to the Moon, Mars, or a Near Earth Object (NEO). We support and applaud the direction of OCT for maintaining close communications and interactions with ESMD, coordinating critical-path technologies and technology development required to execute a roadmap to future human exploration beyond Low Earth Orbit (LEO). Because future technologies represent an area of overlap between OCT and ESMD, these interactions are critical to avoid duplication, cross purposes, and gaps, and may result in schedule and cost savings, and position NASA to more effectively execute a future space exploration effort. We encourage continued collaboration and request a future update on coordination within the NASA OCT and ESMD.

Tracking Number: 2010-03-13 (SC-01)
Interaction with the Joint Program Satellite System

Recommendation:
The Council recommends that appropriate forums be established that will facilitate the development of an integrated observing space-based strategy for both research and operational National Satellite Systems.

Tracking Number: 2010-03-14 (SC-02)
Preserving Sites on the Moon Containing Evidence of Past Human Activity

Observation:
Future exploration of the Moon, whether by governmental or commercial entities, is likely to result in visits to sites of past human activity such as Apollo landing sites, Surveyor and Luna landing sites, and sites of crashed spacecraft and rocket stages. Such sites contain uniquely valuable artifacts of human presence and of the sequelae of human presence in the space environment. Unique and fragile evidence of such phenomena as "weathering" on the lunar surface, the fate of microbial matter, and the potential long-term viability of spores exposed at the lunar surface are present at these sites. These sites should be protected and their scientific integrity preserved.

Tracking Number: 2010-03-15 (SOC-01)
Establishment of a Technology and Development Clearinghouse

Recommendation:
NASA should establish a technology and development clearinghouse across all NASA disciplines. This could be in the process, format and style of an online wiki where researchers

input their own information (such as type of technology, application, license information, key words, and contact info). This information should be organized to be readily available online to other researchers and the public.

Tracking Number: 2010-03-16 (SOC-02)
Recognition of Space Shuttle Program Manager

Finding:
The Council would like to recognize the Space Shuttle Program Manager John Shannon and his team for their outstanding leadership in safely flying the Shuttle manifest and planning for the safe transition of the Shuttle from flight status to retirement.

Tracking Number: 2010-03-17 (SOC-03)
National Space Policy

Finding:
Due to recent announcements in proposed national policy resulting in a changing environment, there is a need for the deliberate and careful integrated planning of the transition to the new direction, including careful phasing of the Shuttle manifest, transition of the Constellation program, and development of the 21st Century Launch Complex and Technology Development programs.

Tracking Number: 2010-03-18 (SOC-04)
NASA Strategic Plan

Observation:
The Council understands that NASA is developing a Strategic Plan. We are following this process as we believe is it important for NASA's employees to have specific direction as to carrying out the national policy.

Tracking Number: 2010-03-19 (TIC-01)
Office of Chief Technologist Planning Efforts

Finding:
The Office of the Chief Technologist (OCT) should be commended for its outstanding efforts over the past six months in planning and formulating the new Space Technology programs. Additionally, there is strong and broad external support for the Space Technology Program. The Council believes the mechanisms are in place for the Space Technology Program to move from its program formulation phase and to begin program execution once approved by Congress. However, the uncertain resolution of the FY 2011 Budget may cause a significant adverse impact on the OCT's ability to execute the new Space Technology Program.

Tracking Number: 2010-03-20 (TIC-02)
Implementation of New Space Technology Programs

Recommendation:
The Council recommends that NASA allow the Office of the Chief Technologist (OCT) to begin program implementation activities for the new Space Technology programs. This should include the OCT requesting a budget anomaly to the forthcoming "Continuing Resolution," allowing the OCT to begin initial program implementation activities including the issuance of Broad Area Announcements (BAAs) for the new Space Technology programs.

Tracking Number: 2010-03-21 (TIC-03)
Identifying Productivity and Initiative Killers
(starting with FedTraveler)

Recommendation:
The Council recommends that a small ad-hoc NASA Advisory Council group work with NASA to identify the top three most egregious productivity and individual initiative killers (starting with FedTraveler), and determine their costs not just in money but also in employee time. This group should then make recommendations for either eliminating/replacing the offending policy and procedure or software, or replacing it with a small pilot program to establish a best-practice benchmark that might let NASA break out of (sometimes government-wide) solutions that fail to meet the interests of the agency and its people – and provide a positive example to other government agencies.

Tracking Number: 2010-03-22 (Council)
FY 2011 Budget Request for Advanced Technology

Finding:
The Council emphasizes the importance of the President's FY 2011 Budget request for advanced technology R&D (in both the Office of the Chief Technologist and the Exploration Systems Mission Directorate) because it provides a strong foundation for NASA's future.